

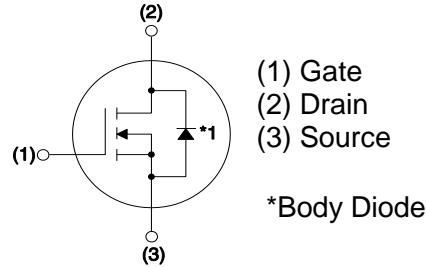
V_{DSS}	1200V
$R_{DS(on)}$ (Typ.)	80m Ω
I_D^{*1}	31A
P_D	165W

●Outline

TO-247N



●Inner circuit



●Features

- 1) Qualified to AEC-Q101
- 2) Low on-resistance
- 3) Fast switching speed
- 4) Fast reverse recovery
- 5) Easy to parallel
- 6) Simple to drive
- 7) Pb-free lead plating ; RoHS compliant

●Application

- Automobile
- Switch mode power supplies

●Packaging specifications

Type	Packing	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	30
	Taping code	C11
	Marking	SCT3080KL

●Absolute maximum ratings ($T_{vj} = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain - Source Voltage	V_{DSS}	1200	V
Continuous Drain current	I_D^{*1}	31	A
	I_D^{*1}	22	A
Pulsed Drain current ($T_c = 25^\circ\text{C}$)	$I_{D,pulse}^{*2}$	77	A
Gate - Source voltage (DC)	V_{GSS}	-4 to +22	V
Gate - Source surge voltage ($t_{surge} < 300\text{nsec}$)	$V_{GSS_surge}^{*3}$	-4 to +26	V
Recommended drive voltage	$V_{GS_op}^{*4}$	0 / +18	V
Virtual Junction temperature	T_{vj}	175	°C
Range of storage temperature	T_{stg}	-55 to +175	°C

●Electrical characteristics ($T_{vj} = 25^\circ\text{C}$ unless otherwise specified)

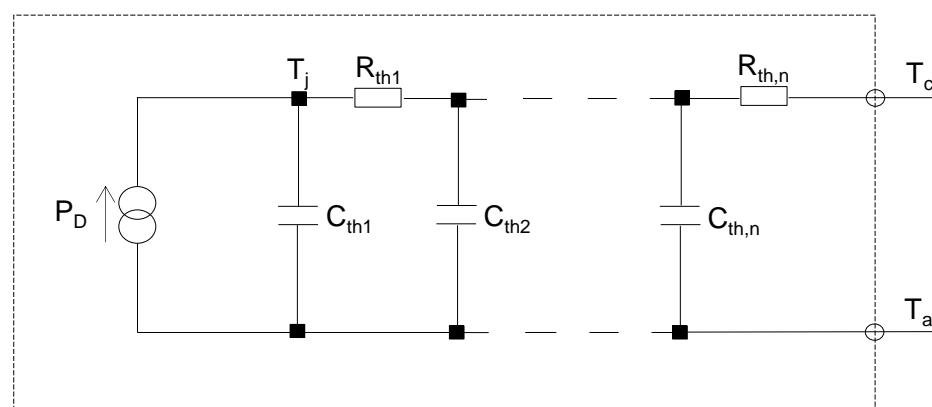
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$V_{GS} = 0\text{V}, I_D = 1\text{mA}$	1200	-	-	V
		$T_{vj} = 25^\circ\text{C}$	1200	-	-	
Zero Gate voltage Drain current	I_{DSS}	$T_{vj} = -55^\circ\text{C}$	1200	-	-	μA
		$T_{vj} = 150^\circ\text{C}$	-	1	10	
Gate - Source leakage current	$I_{\text{GSS}+}$	$V_{GS} = +22\text{V}, V_{DS} = 0\text{V}$	-	-	100	nA
Gate - Source leakage current	$I_{\text{GSS}-}$	$V_{GS} = -4\text{V}, V_{DS} = 0\text{V}$	-	-	-100	nA
Gate threshold voltage	$V_{GS(\text{th})}$	$V_{DS} = 10\text{V}, I_D = 5\text{mA}$	2.7	-	5.6	V
Static Drain - Source on - state resistance	$R_{\text{DS}(\text{on})}^{*5}$	$V_{GS} = 18\text{V}, I_D = 10\text{A}$	-	80	104	$\text{m}\Omega$
		$T_{vj} = 25^\circ\text{C}$	-	136	-	
Gate input resistance	R_G	f = 1MHz, open drain	-	12	-	Ω

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	R_{thJC}	-	0.70	0.91	K/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit	Symbol	Value	Unit
$R_{\text{th}1}$	9.00E-02	K/W	$C_{\text{th}1}$	1.23E-03	Ws/K
$R_{\text{th}2}$	5.96E-01		$C_{\text{th}2}$	7.32E-03	
$R_{\text{th}3}$	1.47E-02		$C_{\text{th}3}$	1.64E-01	



●Electrical characteristics ($T_{vj} = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Transconductance	g_{fs}^{*5}	$V_{DS} = 10\text{V}$, $I_D = 10\text{A}$	-	4.4	-	S
Input capacitance	C_{iss}	$V_{GS} = 0\text{V}$ $V_{DS} = 800\text{V}$ $f = 1\text{MHz}$	-	785	-	pF
Output capacitance	C_{oss}		-	75	-	
Reverse transfer capacitance	C_{rss}		-	35	-	
Effective output capacitance, energy related	$C_{o(er)}$	$V_{GS} = 0\text{V}$ $V_{DS} = 0\text{V to } 600\text{V}$	-	74	-	pF
Total Gate charge	Q_g^{*5}	$V_{DS} = 600\text{V}$ $I_D = 10\text{A}$ $V_{GS} = 18\text{V}$	-	60	-	nC
Gate - Source charge	Q_{gs}^{*5}		-	11	-	
Gate - Drain charge	Q_{gd}^{*5}		-	31	-	
Turn - on delay time	$t_{d(on)}^{*5}$	$V_{DS} = 400\text{V}$ $I_D = 10\text{A}$ $V_{GS} = 0\text{V} + 18\text{V}$ $R_G = 0\Omega$ $R_L = 40\Omega$ See Fig. 1-1, 1-2.	-	15	-	ns
Rise time	t_r^{*5}		-	22	-	
Turn - off delay time	$t_{d(off)}^{*5}$		-	29	-	
Fall time	t_f^{*5}		-	24	-	
Turn - on switching loss	E_{on}^{*5}		-	132	-	
Turn - off switching loss	E_{off}^{*5}	$V_{DS} = 600\text{V}$ $V_{GS} = 0\text{V} / 18\text{V}$, $I_D = 10\text{A}$ $R_G = 0\Omega$, $L = 750\mu\text{H}$ E_{on} includes diode reverse recovery $L_\sigma = 50\text{nH}$, $C_\sigma = 200\text{pF}$ See Fig. 2-1, 2-2.	-	18	-	μJ

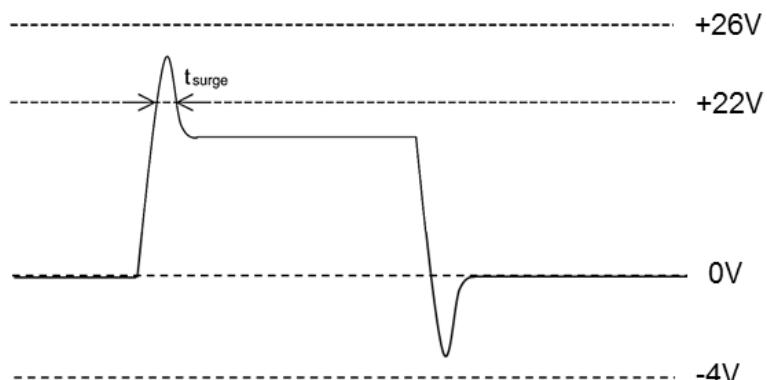
●Body diode electrical characteristics (Source-Drain) ($T_{vj} = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous, forward current	I_S^{*1}	$T_c = 25^\circ\text{C}$	-	-	31	A
Body diode direct current, pulsed	I_{SM}^{*2}		-	-	77	A
Forward voltage	V_{SD}^{*5}	$V_{GS} = 0\text{V}$, $I_S = 10\text{A}$	-	3.2	-	V
Reverse recovery time	t_{rr}^{*5}	$I_F = 10\text{A}$ $V_R = 600\text{V}$ $di/dt = 1100\text{A}/\mu\text{s}$	-	17	-	ns
Reverse recovery charge	Q_{rr}^{*5}		-	50	-	nC
Peak reverse recovery current	I_{rrm}^{*5}		-	6	-	A
		See Fig. 3-1, 3-2.				

*1 Limited by maximum T_{vj} and for Max. R_{thJC} .

*2 PW $\leq 10\mu\text{s}$, Duty cycle $\leq 1\%$

*3 Example of acceptable V_{GS} waveform



*4 Please be advised not to use SiC-MOSFETs with V_{GS} below 13V as doing so may cause thermal runaway.

*5 Pulsed

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

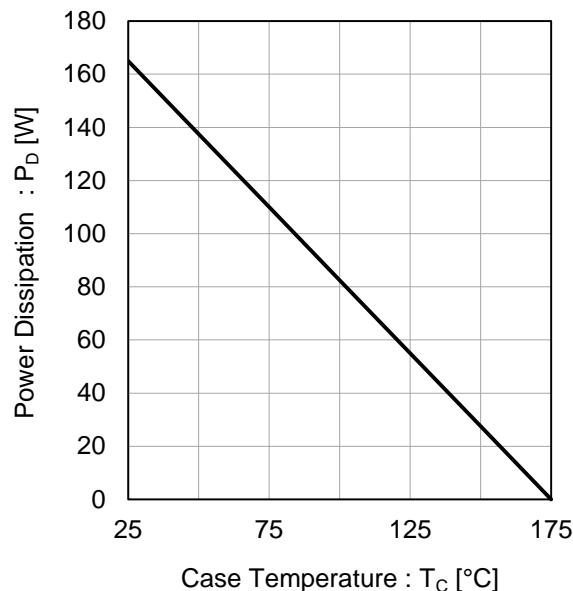


Fig.2 Maximum Safe Operating Area

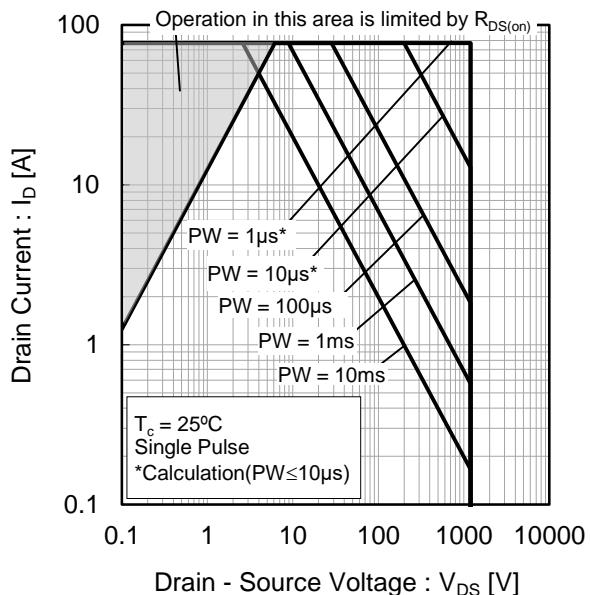
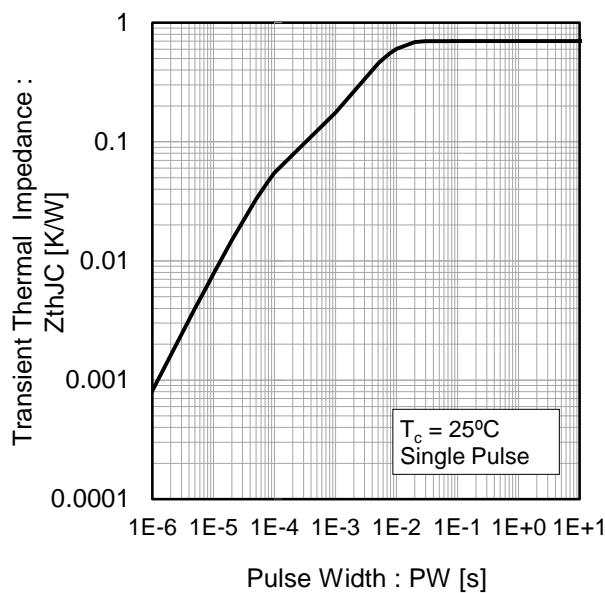


Fig.3 Typical Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

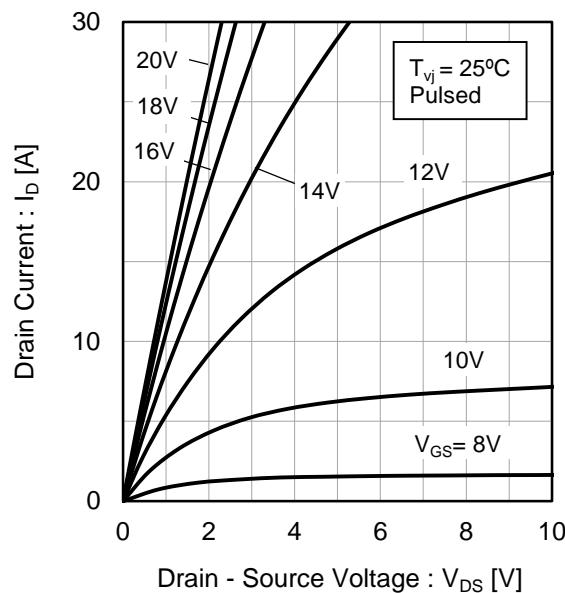
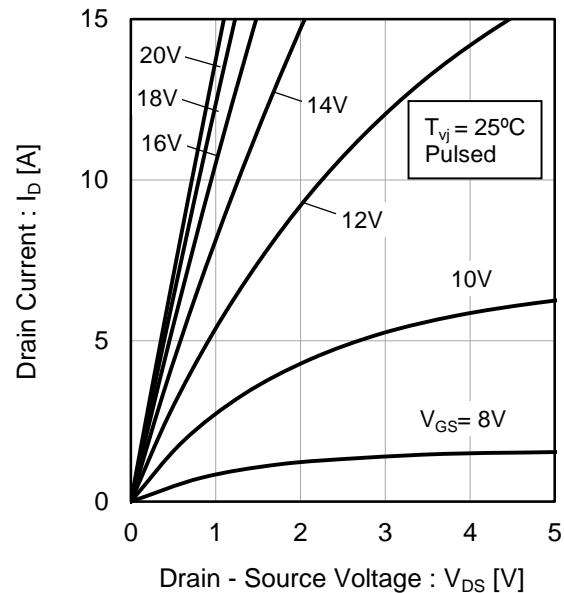
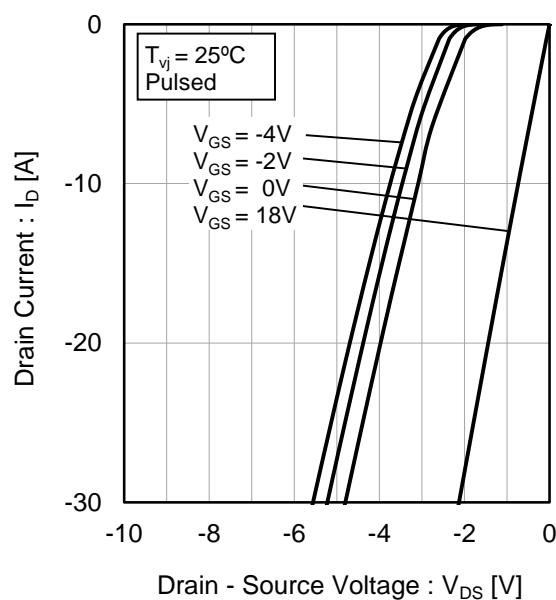


Fig.5 Typical Output Characteristics(II)

Fig.6 $T_{vj} = 25^\circ\text{C}$ 3rd Quadrant Characteristics

●Electrical characteristic curves

Fig.7 $T_{vj} = 150^{\circ}\text{C}$ Typical Output Characteristics(I)

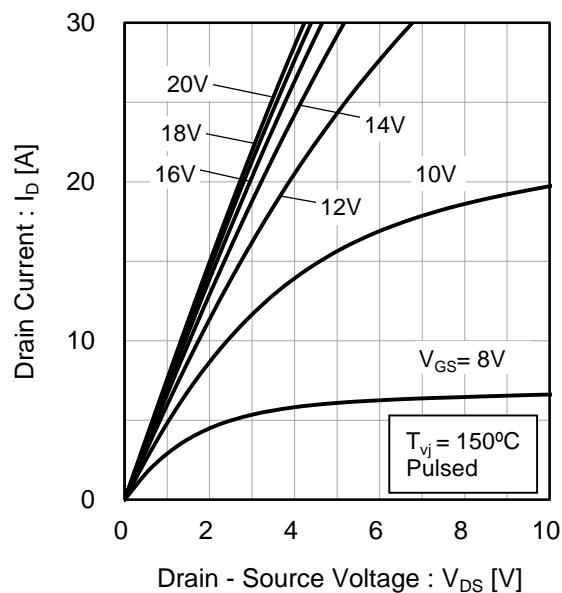


Fig.8 $T_{vj} = 150^{\circ}\text{C}$ Typical Output Characteristics(II)

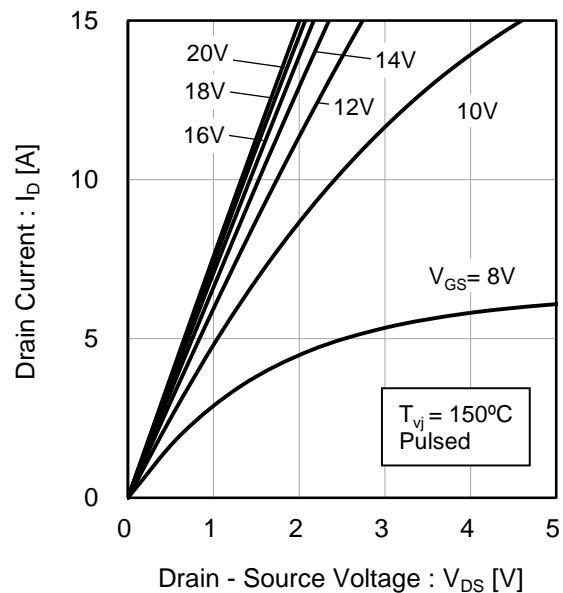


Fig.9 $T_{vj} = 150^{\circ}\text{C}$ 3rd Quadrant Characteristics

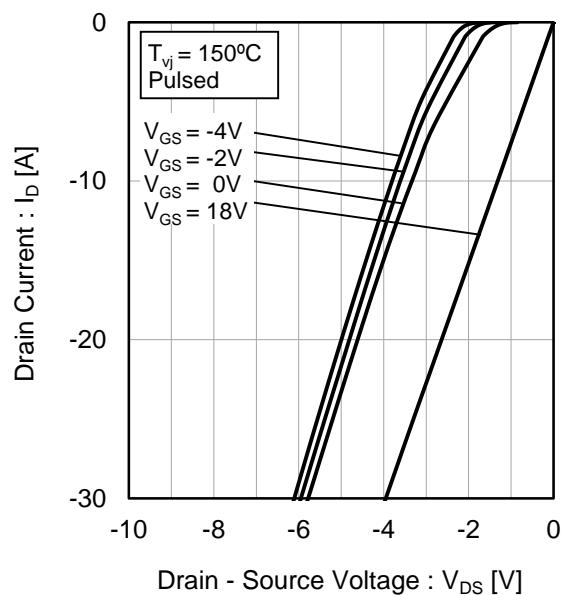
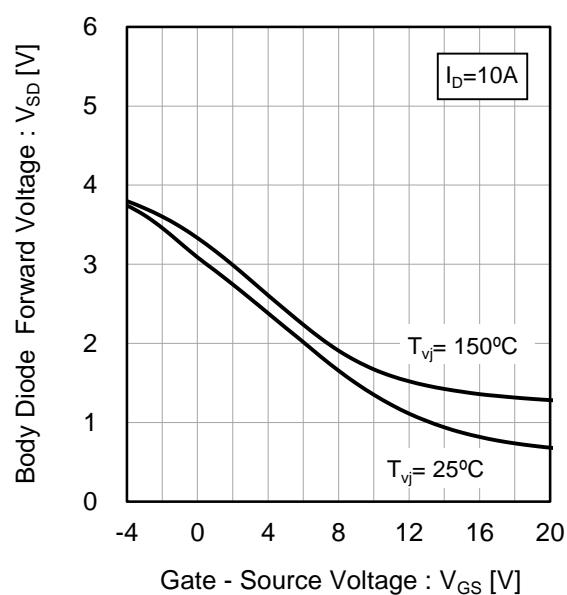


Fig.10 Body Diode Forward Voltage vs. Gate - Source Voltage



●Electrical characteristic curves

Fig.11 Typical Transfer Characteristics (I)

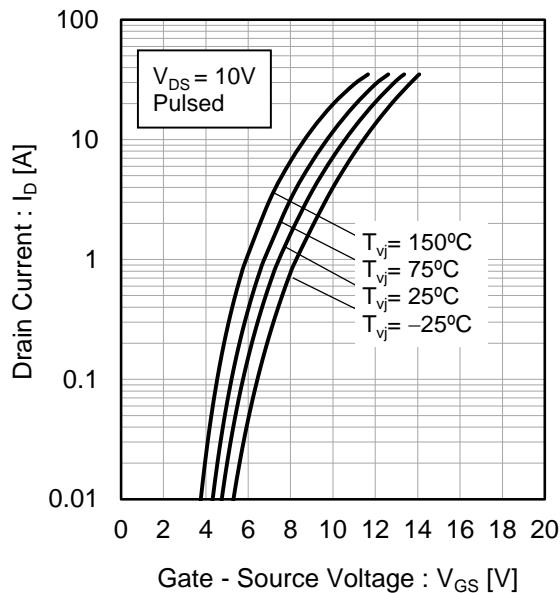


Fig.12 Typical Transfer Characteristics (II)

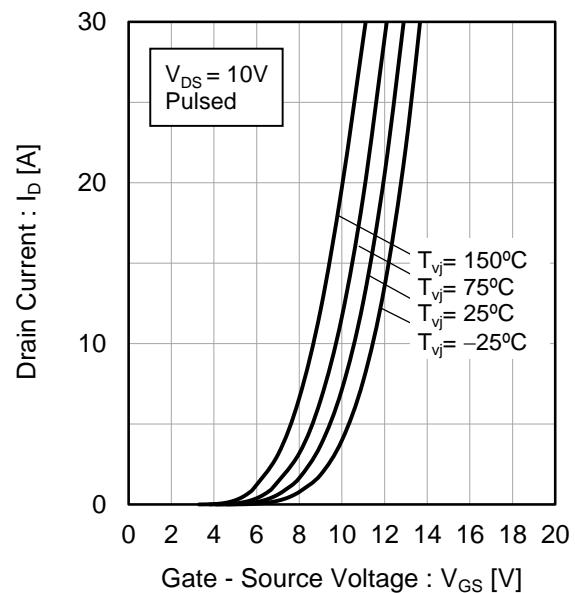


Fig.13 Gate Threshold Voltage vs. Junction Temperature

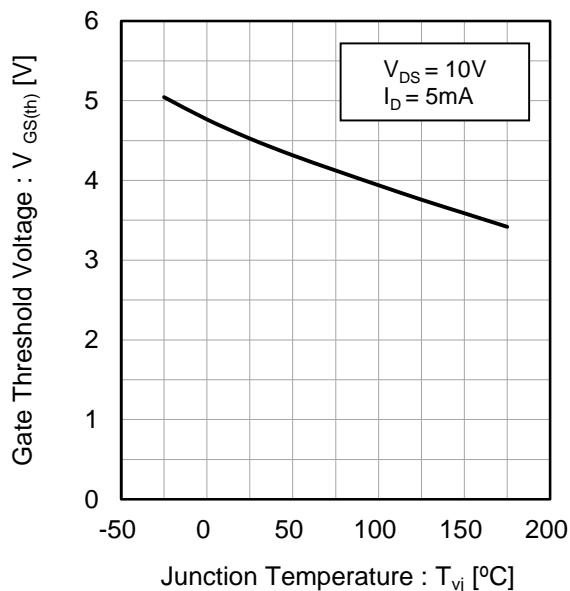
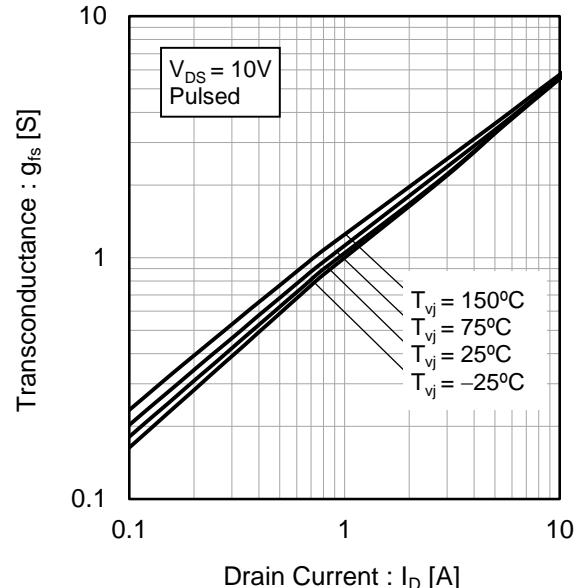


Fig.14 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.15 Static Drain - Source On - State Resistance vs. Gate - Source Voltage

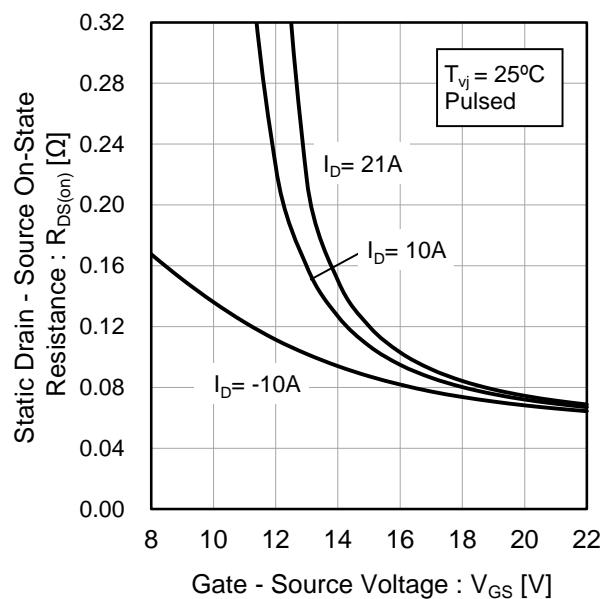


Fig.16 Static Drain - Source On - State Resistance vs. Junction Temperature

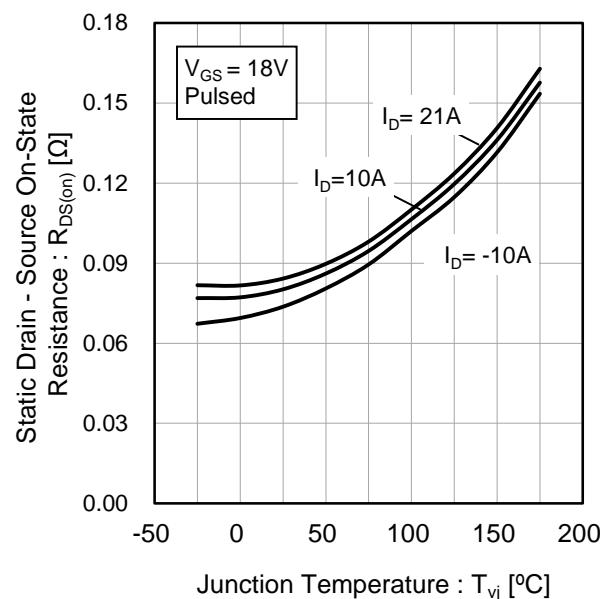


Fig.17 Static Drain - Source On - State Resistance vs. Drain Current

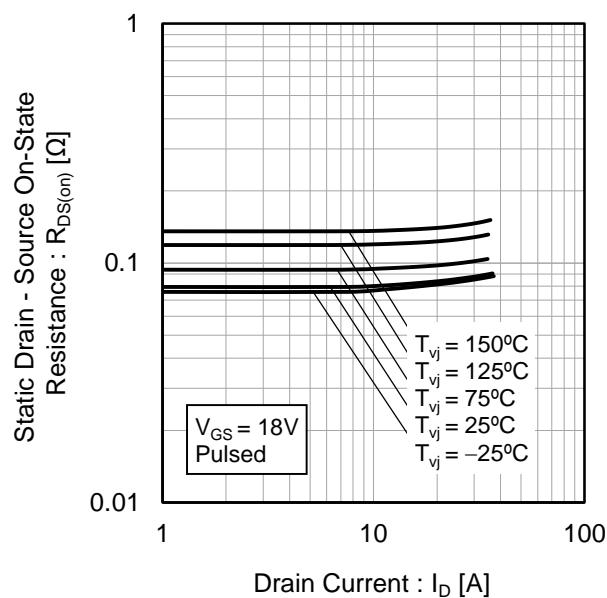
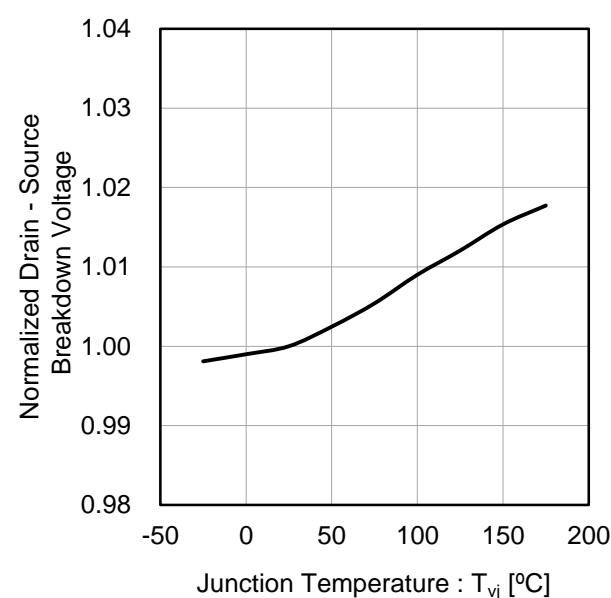


Fig.18 Normalized Drain - Source Breakdown Voltage vs. Junction Temperature



●Electrical characteristic curves

Fig.19 Typical Capacitance vs. Drain - Source Voltage

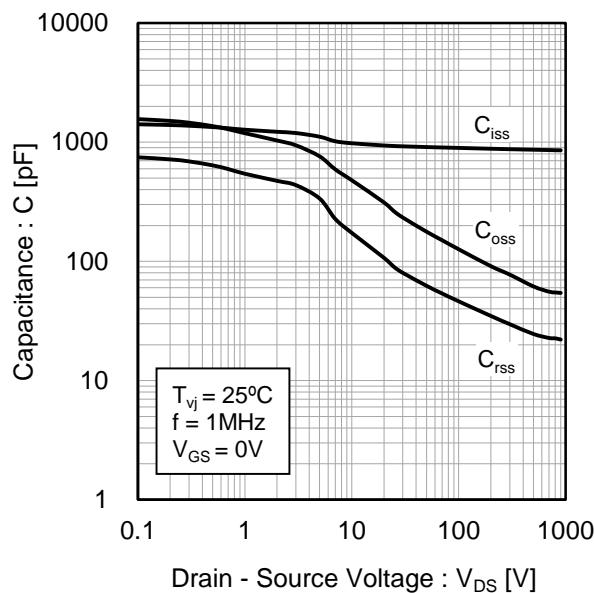


Fig.20 C_{oss} Stored Energy

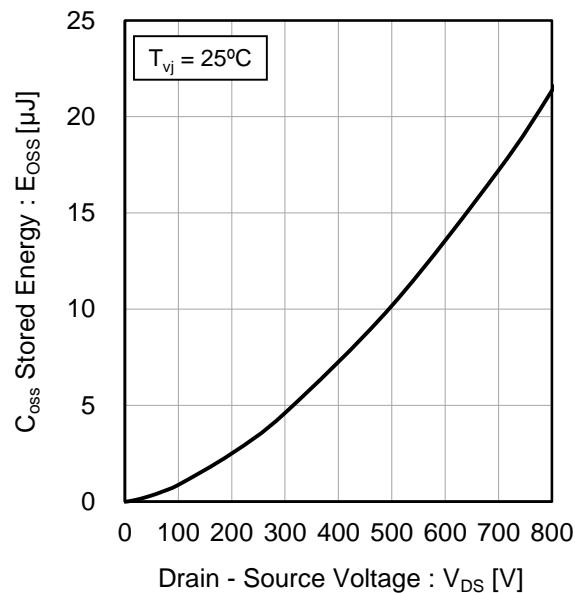
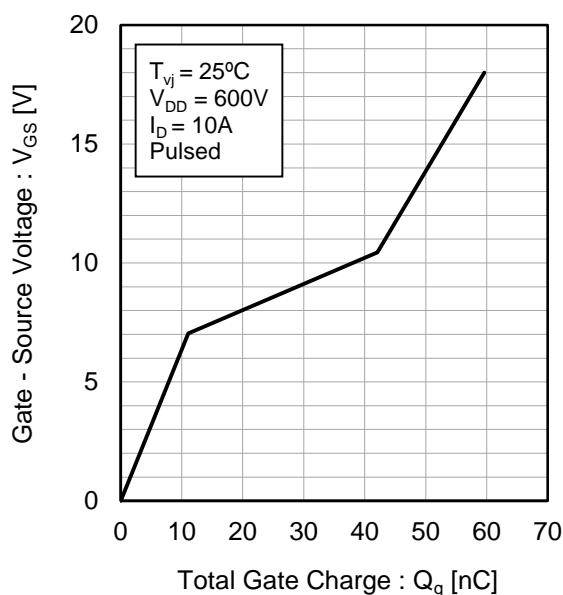
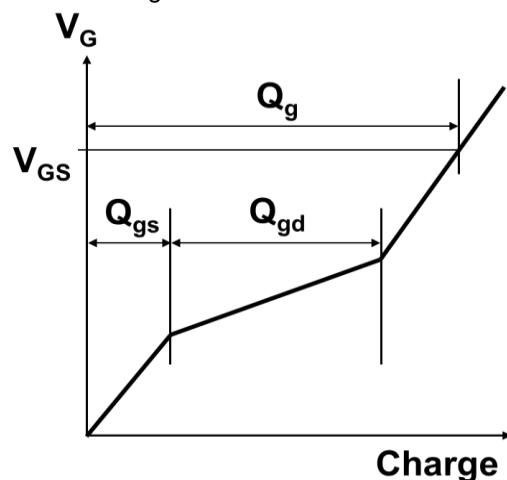


Fig.21 Dynamic Input Characteristics



*Gate Charge Waveform



●Electrical characteristic curves

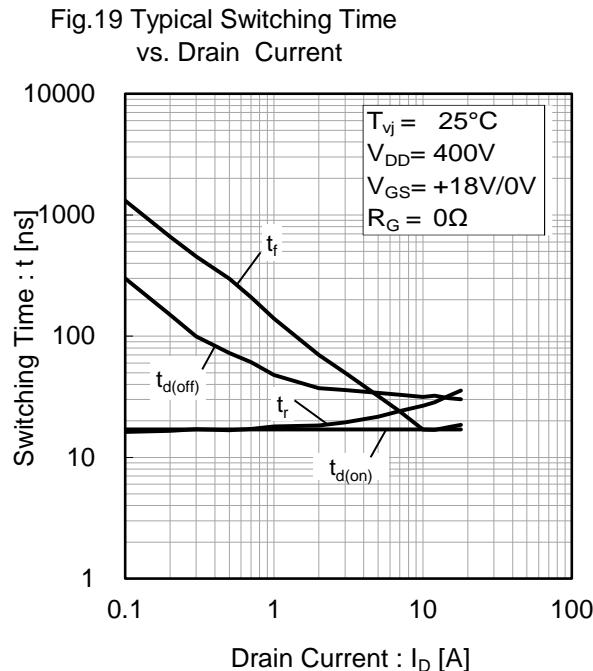


Fig.20 Typical Switching Loss vs. Drain - Source Voltage

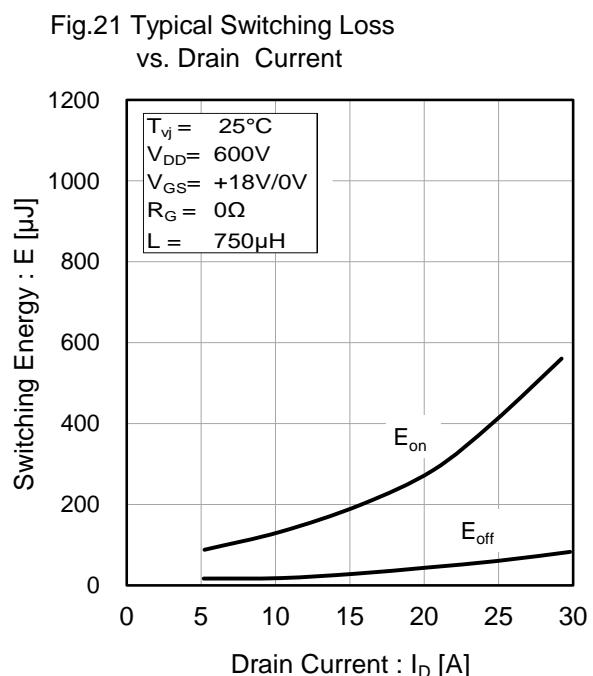
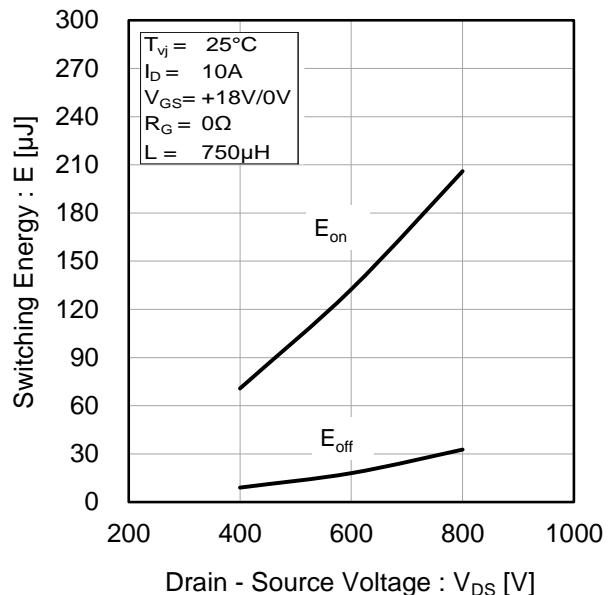
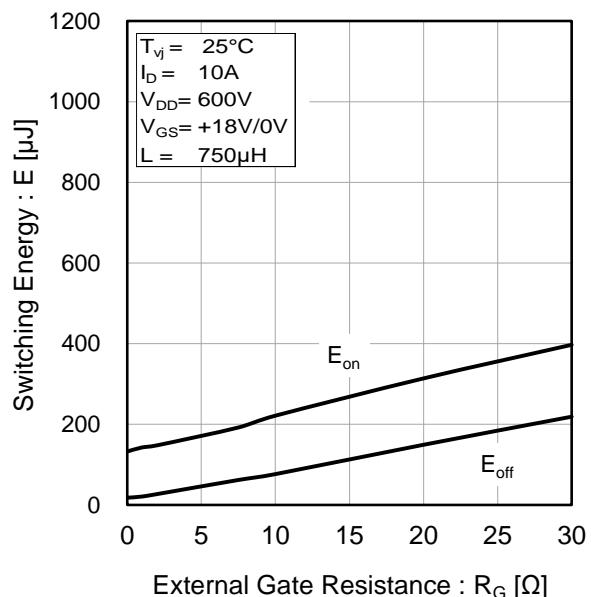


Fig.22 Typical Switching Loss vs. External Gate Resistance



●Measurement circuits and waveforms

Fig.1-1 Gate Charge and Switching Time Measurement Circuit

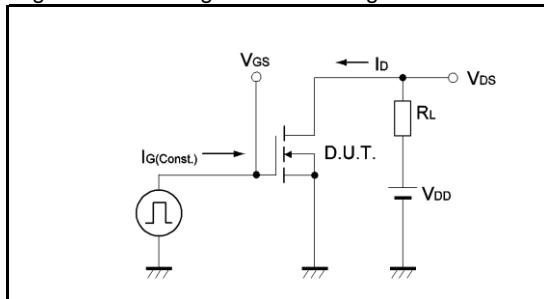


Fig.1-2 Waveforms for Switching Time

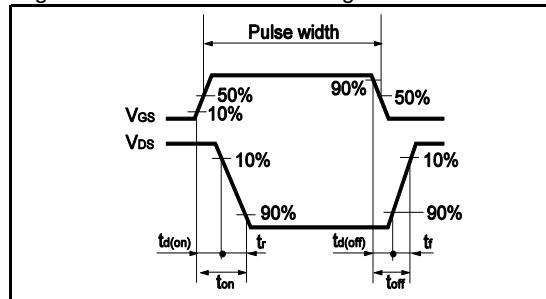


Fig.2-1 Switching Energy Measurement Circuit

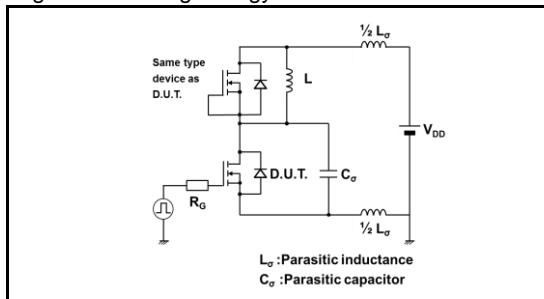


Fig.2-2 Waveforms for Switching Energy Loss

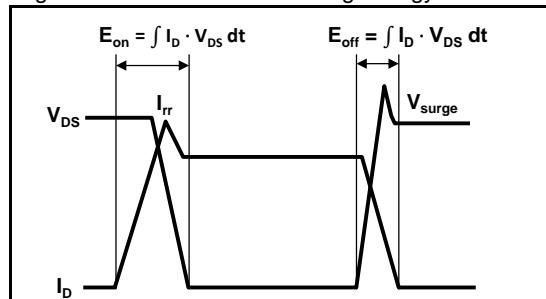


Fig.3-1 Reverse Recovery Time Measurement Circuit

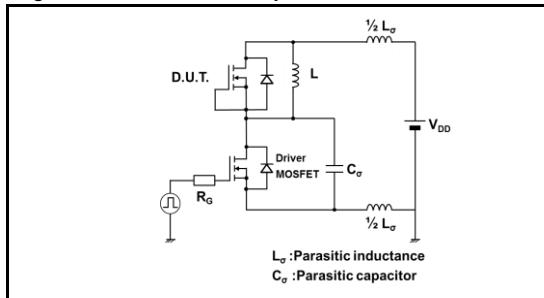
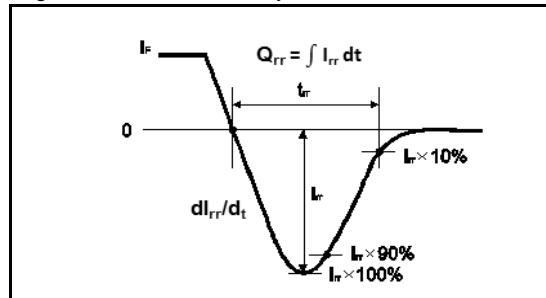
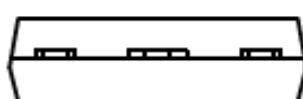
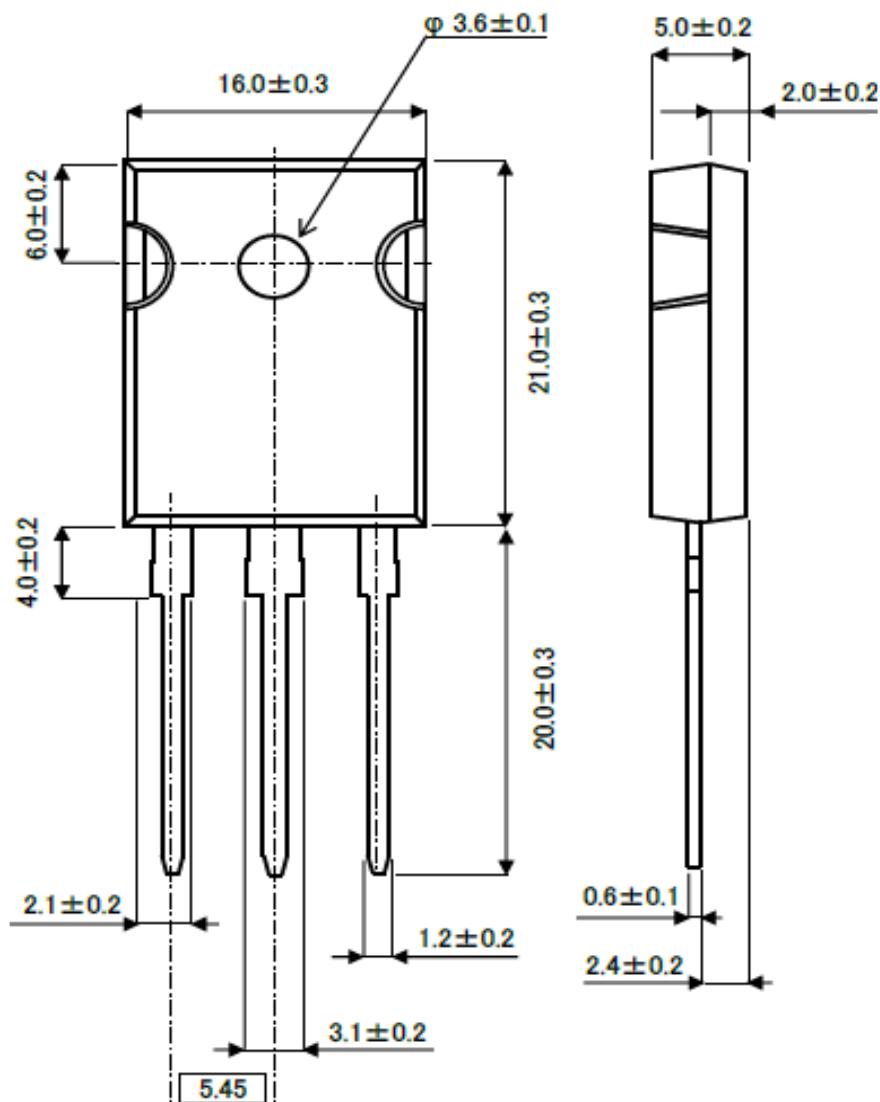
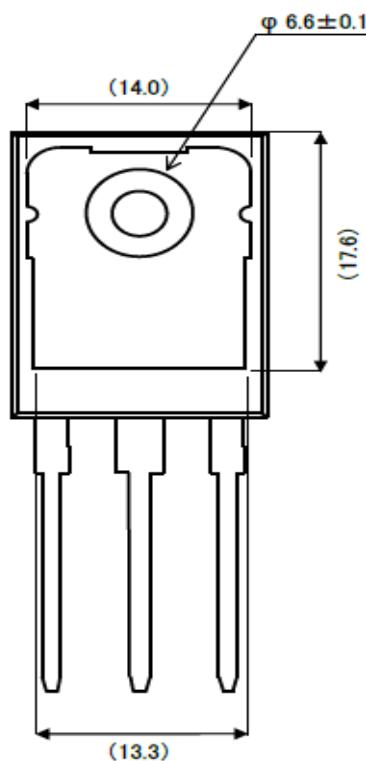


Fig.3-2 Reverse Recovery Waveform

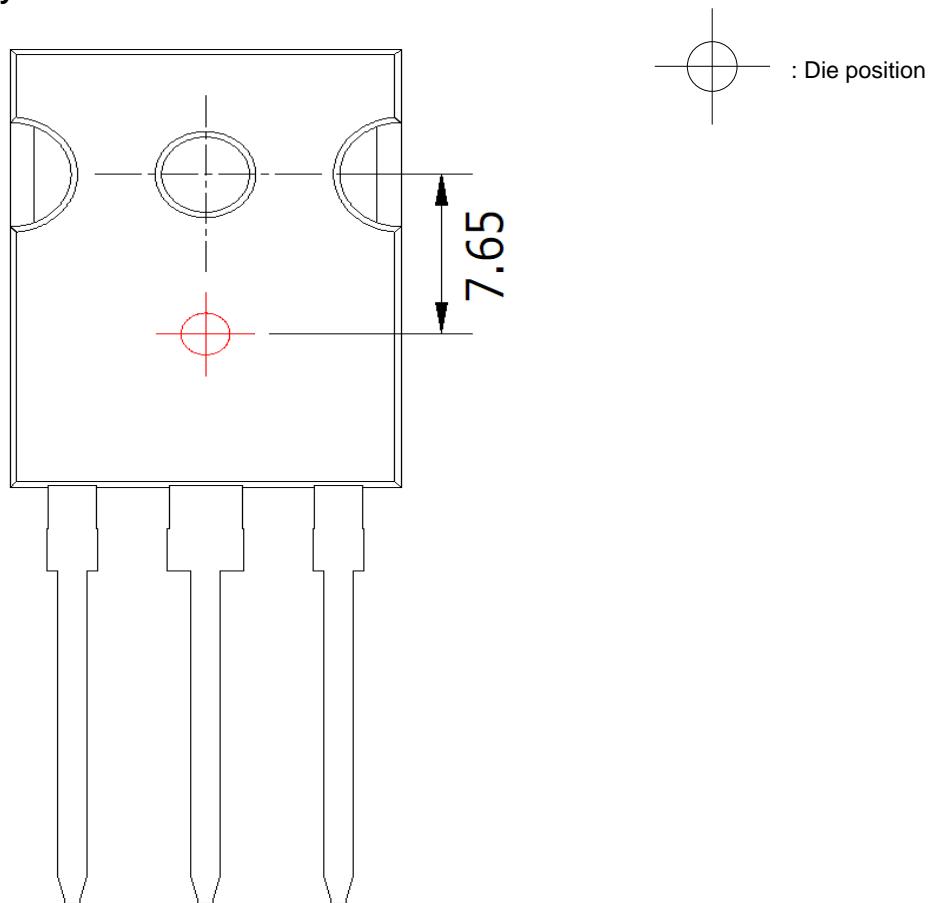


● Package Dimensions

Unit: mm



Unit: mm

●Die Bonding Layout

- Front view of the packaging.
- Dimensions are design values.
- If the heat sink is to be installed, it should be in contact with the die bonding point.

Unit: mm

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